

What Is Claimed Is:

1. A method including:
  - securing a base portion of a guide lumen carrying assembly around an entry
  - portal in a surface;
  - rotating at least a portion of the guide lumen carrying assembly about a first
  - axis that is substantially concentric to the entry portal and substantially orthogonal
  - to the surface; and
  - tilting at least a portion of the assembly so that a second axis, extending
  - concentrically through the guide lumen, is at a desired angle with the first axis.
2. The method of claim 1, further including spherically adjusting a portion of
- the guide-lumen carrying assembly to orient a trajectory provided by the second axis
- in a desired direction with respect to the entry portal.
3. The method of claim 2, further including fixing a position of the guide
- lumen.
4. The method of claim 3 in which fixing the position of the guide lumen
- includes at least one of: securing the rotating portion of the guide-lumen assembly;
- securing the tilting portion of the guide-lumen carrying assembly; and securing the
- spherically adjustable portion of the guide lumen carrying assembly.
5. The method of claim 2, in which spherically adjusting includes adjusting an
- orientation of a ball housed in a socket.
6. The method of claim 5, in which spherically adjusting includes moving a
- position of the ball within the socket using at least one threaded member engaging
- the ball.

7. The method of claim 1, further including fixing a position of the guide lumen.

8. The method of claim 1, further including introducing an instrument through the guide lumen and the portal substantially along a trajectory provided by the second axis.

9. The method of claim 8, in which introducing the instrument includes introducing at least one instrument selected from the group consisting essentially of a sheath, a stylet, a guide, a primary medical instrument, and an electrode.

10. The method of claim 8, in which introducing the instrument includes: coupling a sliding clamp to a portion of the guide-lumen carrying assembly; clamping a portion of the instrument to the clamp; and advancing the sliding clamp toward the entry portal.

11. The method of claim 8, in which introducing the instrument includes: inserting a stylet into a lumen of a sheath; and advancing the stylet and sheath through the guide lumen and the entry portal.

12. The method of claim 11, further including removing the stylet from the lumen of the sheath.

13. The method of claim 12, further including inserting an electrode into the lumen of the sheath and through the guide-lumen and through the entry portal.

14. The method of claim 13, further including retracting the sheath from the entry portal by peeling the sheath into more than one piece.

15. The method of claim 13, further including adjusting a distance by which the sheath extends into the entry portal by viewing an indicator on the sheath.

16. The method of claim 1, further including receiving, into the guide-lumen, a portion of an imagable device.
- 5 17. The method of claim 16, in which receiving the portion of the imagable device includes receiving an imagable device selected from the group consisting essentially of an MRI-imagable alignment stem, a CT-imagable alignment stem, and a frameless surgical navigation instrument.
- 10 18. The method of claim 16, in which the rotating and tilting are performed in conjunction with real-time viewing of the imagable device, using a corresponding imaging modality, to align a trajectory of the second axis with a target location located through the entry portal beyond the surface.
- 15 19. The method of claim 1, further including:  
securing a base access plate to the surface around the entry portal;  
introducing an instrument through the entry portal to a target location  
beyond the surface; and  
securing the introduced instrument to the base access plate.
- 20 20. The method of claim 19, further including concentrically aligning the base access plate to the entry portal.
21. The method of claim 20, in which the aligning includes:
- 25 inserting a screw-carrying positioner through an opening in the base access plate and into the entry portal to position the base access plate concentrically around the entry portal;  
screwing the base access plate to the surface, thereby releasing the screws from the screw-carrying positioner; and
- 30 removing the positioner.

22. The method of claim 19, in which securing the introduced instrument includes clamping the introduced instrument.

23. The method of claim 19, further including laterally exiting the instrument  
5 from the base plate.

24. The method of claim 1, further including capping the entry portal.

25. The method of claim 1, further including introducing an instrument through  
10 the guide lumen and the entry portal toward a target location beyond the surface of the entry portal.

26. The method of claim 25, in which the guide lumen is a first guide lumen,  
and further including reintroducing the instrument through a second guide lumen  
15 offset from the first guide lumen by a predetermined distance.

27. The method of claim 1, in which the guide lumen carrying assembly  
provides a plurality of guide lumens, and further including selecting a particular one  
of the guide lumens for introducing an instrument by at least one of orienting and  
20 coupling a guide lumen selector to the guide lumen carrying assembly.

28. A method including:  
securing a base access plate to a surface around an entry portal;  
introducing an instrument through the entry portal to a target location  
25 beyond the surface; and  
securing the introduced instrument to the base access plate.

29. The method of claim 28, further including concentrically aligning the base  
access plate to the entry portal.

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30. The method of claim 28, in which the aligning includes:  
inserting a screw-carrying positioner through an opening in the base access  
plate and into the entry portal to position the base access plate concentrically around  
the entry portal;

5       screwing the base access plate to the surface, thereby releasing the screws  
from the screw-carrying positioner; and  
removing the positioner.

31. The method of claim 28, in which securing the introduced instrument  
10 includes clamping the introduced instrument.

32. The method of claim 28, in which securing the introduced instrument  
includes:

15       selecting an orientation of a stabilizing clamp from a full 360 degree range  
of available orientations with respect to the base access plate; and  
coupling the stabilizing clamp to the base access plate in the selected  
orientation.

33. The method of claim 32, further including:  
20       selecting a radial position of the introduced instrument in an elongate  
opening extending from a center region of the stabilizing clamp; and  
clamping the introduced instrument at the selected radial position.

34. The method of claim 28, further including laterally exiting the instrument  
25 from the base plate.

35. The method of claim 28, further including capping the entry portal.

36. The method of claim 28, further including:  
30       securing a base portion of a guide lumen carrying assembly around an entry  
portal in a surface;

rotating at least a portion of the guide lumen carrying assembly about a first axis that is substantially concentric to the entry portal and substantially orthogonal to the surface; and

slidably tilting at least a portion of the assembly so that a second axis,  
5 extending concentrically through the guide lumen, is at a desired angle with the first axis.

37. A method including:

securing a base portion of a multiple primary guide lumen carrying assembly  
10 around an entry portal in a surface;

orienting a secondary guide lumen, with respect to a plurality of coupling locations of the primary guide lumen carrying assembly, such that the secondary guide lumen aligns with a desired one of the multiple primary guide lumens; and

coupling the secondary guide lumen to the primary guide lumen carrying  
15 assembly in the selected orientation.

38. The method of claim 37, further including introducing an instrument through the secondary guide lumen and the aligned one of the primary guide lumens.

20 39. The method of claim 38, further including:

introducing a sheath into the aligned one of the primary guide lumens; and  
holding the sheath at the secondary guide lumen as the instrument is inserted  
through the secondary guide lumen and the aligned one of the primary guide lumens  
through the sheath.

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40. The method of claim 39, further including securing the instrument near the secondary guide lumen before removing the sheath.

41. The method of claim 40, in which removing the sheath includes pulling the  
30 sheath out in a plurality of pieces.

42. A method including:  
introducing a sheath through a portal in a surface to a target location;  
introducing an instrument through the sheath to the target location;  
rotating first and second portions of the sheath with respect to each other to  
5 create an access opening in the sheath above the surface of the portal, thereby  
exposing a portion of the instrument;  
securing an exposed portion of the instrument; and  
removing the sheath.
- 10 43. A method including:  
securing a base portion of a guide lumen carrying assembly around an entry  
portal in a surface, the guide lumen providing a trajectory axis, and the body portal  
providing a portal normal axis that is orthogonal to the surface of the body portal;  
adjusting an angle between the trajectory axis and the portal normal axis by  
15 pivoting an arcuate portion of the guide lumen carrying assembly with respect to the  
base; and  
adjusting the angle between the trajectory axis and the portal normal axis by  
sliding a portion of the guide lumen carrying assembly along the arcuate portion of  
the guide lumen carrying assembly.
- 20 44. The method of claim 43, further including spherically adjusting the guide  
lumen with respect to the arcuate portion of the guide lumen carrying assembly.
45. The method of claim 43, further including introducing a primary medical  
25 device along the trajectory axis.
46. An access device including:  
a mounting unit having a mounting plane; and  
a primary guide assembly that defines at least one insertion axis, the guide  
30 assembly being attached to the support structure by at least one joint.

47. The access device of claim 46, in which the at least one joint includes a rotating joint allowing rotation of the primary guide structure about a rotation axis normal to the mounting plane.

5 48. The access device of claim 47, further including a first locking device that fixes an orientation of the rotating joint.

49. The access device of claim 47, in which the at least one joint includes an arcuate sliding joint capable of adjusting an insertion angle of at least one insertion  
10 axis with respect to the mounting plane.

50. The access device of claim 49, in which the at least one joint includes a ball and socket joint, coupled to the arcuate sliding joint, allowing further adjustment of the insertion angle.

15 51. The access device of claim 50, further including a third locking device that fixes the ball and socket joint within a range of motion.

52. The access device of claim 50, in which the primary guide assembly is  
20 detachable from the ball-and-socket joint, a portion of the primary guide assembly fitting within a ball of the ball-and-socket joint using a tapered outside surface so that the primary guide assembly is held in the ball by a wedge formed by the tapered outside surface.

25 53. The access device of claim 50, in which the ball-and-socket joint further includes a plurality of ball adjustment contacts, each ball adjustment contact being adjustable with respect to a socket of the ball-and-socket joint, and each ball adjustment contact being in communication with the ball.



54. The access device of claim 53, in which the plurality of ball adjustment contacts include threaded members that are threaded through the socket, and contact the ball.

5 55. The access device of claim 49, further including a second locking device that fixes the insertion angle within a range of motion.

56. The access device of claim 46, further including a reference device coupled to the primary guide assembly wherein the reference device locates at least one of  
10 the insertion axes.

57. The access device of claim 56, in which the reference device includes a number of light emitting diodes.

15 58. The access device of claim 56, in which the reference device includes a number of light reflectors.

59. The access device of claim 56, in which the reference device includes one or more electrical coils.

20 60. The access device of claim 46, in which at least one insertion axis includes a central insertion axis and a peripheral insertion axis.

61. The access device of claim 46, in which at least one insertion axis includes a  
25 central insertion axis and four peripheral insertion axes.

62. The access device of claim 46, further including a secondary guide device, having a secondary insertion axis, the secondary guide device being coupled to the primary guide assembly.

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63. The access device of claim 62, in which the secondary insertion axis is collinear with the central insertion axis.

5 64. The access device of claim 62, in which the secondary insertion axis is collinear with one of the peripheral insertion axes.

65. An access system including:

an access device including:

10 a mounting unit having a mounting plane;  
a primary guide assembly that defines at least one insertion axis, the guide assembly being attached to the mounting unit by at least one joint; and  
an alignment device coupled to the primary guide assembly, a portion of the alignment device being visible using an imaging device.

15 66. The access system of claim 65, in which the alignment device includes a fluid filled stem that is visible using magnetic resonance imaging (MRI).

20 67. The access system of claim 65, further including a processor that indicates when the insertion axis is aligned with a target within a patient.

68. An access system including:

an access device including:

25 a mounting unit having a mounting plane;  
a primary guide assembly that defines at least one insertion axis, the guide assembly being attached to the mounting unit by at least one joint; and  
at least one sheath adapted for insertion through the primary guide assembly.

30 69. The access system of claim 68, further including at least one stylet adapted for insertion through the at least one sheath.

70 The access system of claim 69, in which the sheath covers a first longitudinal portion of the stylet, leaving a second longitudinal portion of the stylet exposed.

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71. The access system of claim 68, in which the sheath includes a peel-away portion.

10 72. The access system of claim 68, in which the sheath includes:  
a first sheath portion; and  
a second sheath portion capable of rotating with respect to the first sheath portion such that when rotated from a first position to a second position a longitudinal sheath opening is exposed.

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73. An access system including:  
an access device including:  
a mounting unit having a mounting plane;  
a primary guide assembly that defines at least one insertion axis, the  
20 guide assembly being attached to the mounting unit by at  
least one joint; and  
a device introducer that controllably moves a primary device along the  
insertion axis.

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25 74. The access system of claim 73, in which the device introducer includes a locally mounted indicator device that is capable of locating a position of a primary medical device along the insertion axis.

75. The access system of claim 74, in which the locally mounted indicator  
30 device includes at least one of a linear encoder and a potentiometer.

76. An access system including:

an access device including:

a mounting unit having a mounting plane;

5 a primary guide assembly that defines at least one insertion axis, the guide assembly being attached to the mounting unit by at least one joint; and

a fixing device coupled to the mounting unit, the fixing device being capable of fixing the location of a primary device along the insertion axis.

10 77. The access system of claim 76, wherein the fixing device includes:

a body, the body having an opening with a first surface;

a fixing unit, the fixing unit having a second surface that is adjustable with respect to the first surface; and

15 a locking device capable of holding the fixing unit in a position with respect to the body such that the first and second surfaces engage the primary medical device, fixing it in a location along the insertion axis.

20 78. The access system of claim 77, further including a cap that is capable of substantially covering an insertion opening in the mounting unit.

79. The access system of claim 78, further including a groove that allows a primary device to remain fixed in a location along the insertion axis, while the insertion opening is covered with the cap.

25 80. The access system of claim 76, further including a removable centering device, the removable centering device including:

a centering body;

a number of insertion opening contacts coupled to the centering body; and

30 an attachment device that is removably coupled to the mounting unit during a mounting procedure.

81. An access device including:  
a mounting unit having a mounting plane;  
a primary guide assembly that defines at least one insertion axis, the guide assembly being attached to the support structure by a number of joints including:  
5 a pivot joint capable of adjusting a first insertion angle of at least one insertion axis with respect to a first direction in the mounting plane; and  
an arcuate sliding joint capable of adjusting a second insertion angle of at least one insertion axis with respect to a second direction in the mounting plane.

10 82. The access device of claim 81, further including a ball-and-socket joint, coupled to the arcuate sliding joint, allowing further adjustment of the orientation of the primary guide assembly.

15 83. The access device of claim 82, further including a device introducer coupled to the primary guide assembly that controllably moves a primary device along the insertion axis.

84. A primary device retention system including:  
20 a base having a mounting plane and an insertion opening, the base being capable of being attached to a body; and  
a fixing device coupled to the base, the fixing device being capable of fixing the location of a primary device within the body.

25 85. The system of claim 84, wherein the fixing device includes:  
a first portion, the first portion having an opening that includes a first surface;  
a second portion, the second portion having a second surface that is adjustable with respect to the first surface; and

a locking device capable of holding the second portion in a position with respect to the first portion such that the first and second surfaces engage the primary device, fixing it in a location within the body.

5 86. The system of claim 85, in which the fixing device is coupled to the base such that the fixing device is capable of rotating about an axis normal to the mounting plane.

87. The system of claim 86, in which the first surface includes a radially  
10 oriented planar surface.

88. The system of claim 87, in which the base includes:  
at least one opening to accommodate a proximal portion of the primary  
device;  
15 the fixing device being capable of rotating the radially oriented planar surface into alignment with the at least one opening and fixing the location of the primary device within the body while the proximal portion of the primary device is routed in the at least one opening.

20 89. The system of claim 84, further including a cap that is capable of covering the insertion opening in the base.

90. A device for immobilizing a primary instrument, including:  
a base; and  
25 attached to the base, a stabilizer to engage the instrument, the stabilizer including a movable cam to define an opening sized and shaped to immobilize the instrument.

30 91. A device for immobilizing a primary instrument, including:  
a base;

a resilient lower plate stabilizer to engage the instrument, the lower plate stabilizer being configured to rest on the base and including at least one flexible opening sized and shaped to at least partially surround the instrument when normally relaxed and to immobilize the instrument when compressed inwardly toward the instrument; and

an upper plate that is relatively more rigid than the resilient lower plate stabilizer, configured to rest on the resilient lower plate, and comprising a feature complementary to the normally relaxed size and shape of each flexible opening of the resilient lower plate stabilizer, yet shaped and sized to compress each such flexible opening inwardly upon compression of the upper plate and lower plate together.

92. A device for immobilizing a primary instrument, including:  
a base;

attachable to the base, a resilient detachable C-shaped stabilizer to engage the instrument, the C-shaped stabilizer being configured to rest on the base and defining a flexible wedge-shaped angular opening sized and shaped to immobilize the instrument when normally relaxed yet release the instrument when expanded circumferentially away from the instrument; and

attachable to the wedge-shaped opening of the C-shaped stabilizer, a separate spreader that includes a pair of surfaces angularly spaced from each other by an amount greater than the amount of the flexible wedge-shaped angular opening of the resilient C-shaped stabilizer when normally relaxed.

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